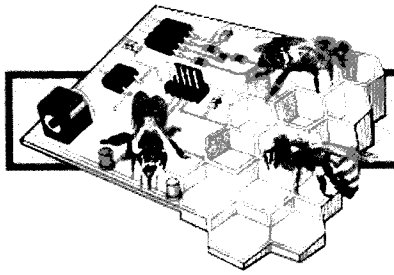
EXHIBIT 3
DATE 3/19/09
SB 322



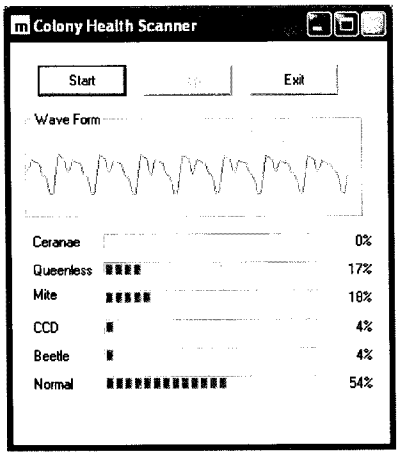
Bee Alert Technology, Inc.

1620 Rodgers St., Suite #1
Missoula, Montana 59802
406-541-3160

Determining Honey Bee Colony Health Without Opening the Hive

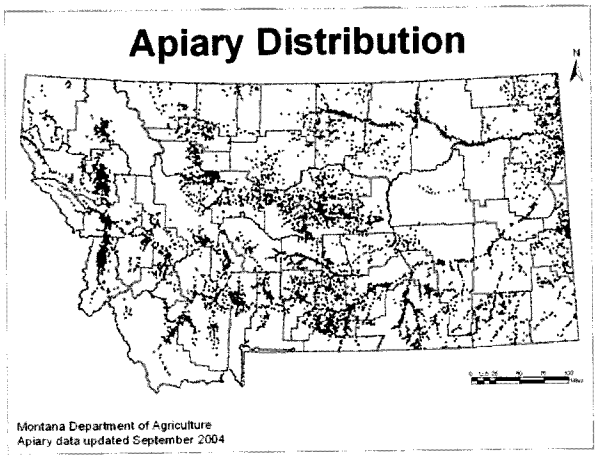
Montana Board of Research and Commercialization Technology - Award #08-52

When a person is sick, they can describe to you how they feel. Until now, we've guessed what is wrong with our hives based on visual inspections and diagnostic tests. The Colony Health Scanner uses sonographic analysis to listen to what the bees are saying, and decodes it.

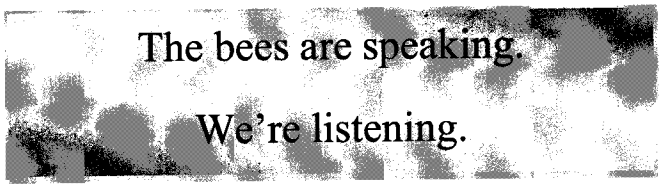


When honey bees detect a new stimulus, they change the pitch of their buzz. A stimulus causes the bees to make a unique buzz pitch. This is one way honey bees communicate within the hive. So if one bee makes the "I have a varroa mite" buzz, you can identify it with the Scanner. And if a lot of bees are making the "I have a varroa mite" buzz, you know you have a sick hive on your hands, and you can medicate accordingly. Simple by inserting an unobtrusive microphone into a hive and listening for 30 seconds, the Scanner can identify states such as mite-infested, hive beetle infested, queenless, CCD stricken, *Nosema*, and healthy. This software has an 85% accuracy rate of identifying the disease.

This technology has the potential to save beekeepers and bee breeders a lot of time and money. Instead of hive inspections that drag on for weeks in a commercial operation, a simple 30 second recording can tell the beekeeper everything he or she needs to know about the health of the colony. It also eliminates the need for trained workers in the field, since any layman can utilize this software.



The software currently runs on PC's and PDA's. We're working on an embedded, always-on system for remote hives. In the future, we hope to offer a ruggedized hand-held unit to beekeepers so they can go into their apiary with this device in hand and determine the health of their colonies.



BeeAlert@BeeAlert.info

12 Copies Please

Curtiss

EXHIBIT 3
DATE 3/19/09
SB 322

Independent Record 2-1-09

IR 2-1-09

Beekeepers fear sting of imported Australian hives

By GARANCE BURKE
Associated Press

ATWATER, Calif. — Beekeepers who are battling a mysterious ailment that led to the disappearance of millions of honeybees now fear the sting of imported Australian bees that they worry could outcompete their hives and might carry a deadly parasite unseen in the United States.

The U.S. Department of Agriculture has allowed shipments of Australian bees to resume despite concerns by some of its own scientists.

Australia had been air-freighting the insects across the Pacific for four years to replace hives devastated by the perplexing colony collapse disorder. But six weeks ago the Australian government abruptly stopped the shipments, saying it could no longer be certain the country was free of a smaller, aggressive bee that has infested areas near the Great Barrier Reef, U.S. officials said.

The USDA decided to permit the bee shipments to resume with some precautions, and the first planeloads arrived in San Francisco earlier this month.

Beekeeper Ken Haff of Mandan, N.D., says he fears the foreign hives could kill off his apiary.

"We've got enough problems with our own bee diseases that we don't know how to treat, and they open the border to a whole new species that could carry God knows what," said Haff, a vice president of the American Honey Producers Association. "That's a total slap in the face for us."

Shad Sullivan, a bee wholesaler in California's Central Valley, said that in the four years he has imported bees from Australia, he has found that the hearty imports outlive domestic bees that have been weakened by pesticides, pests and diseases.

"If the bees were truly carrying something that bad, I would have been the first to get it," Sullivan said as a thick cloud of the buzzing insects flew overhead. "I just haven't seen those kinds of devastation."

Domestic honeybees feed on most flowering plants, and are vital pollinators for many food crops.

However, domestic bee stocks have been waning since 2004, when scientists first got reports of the puzzling illness that has claimed up to 90 percent of commercial hives and has been labeled colony collapse disorder.

That's also the year the USDA allowed imports of Australian hives, and scientists have been investigating whether Australia was a source of a virus tied to the bee die-off.

Entomologists also fear that the aggressive bee species found near Australia's Great Barrier Reef could carry a deadly mite, said Jeff Pettis, the USDA's top bee scientist.

"This could be a threat worldwide, because if those bees are moving around the chances are this mite would move with it," Pettis said. "We just don't need another species causing problems."

The Australian government has adopted emergency controls to quarantine and destroy the aggressive bees and has never detected that mite, according to materials provided by Chelsey Martin, counselor for public affairs at the Australian Embassy in Washington.

U.S. agriculture officials say they also are taking precautions.

Agricultural officials started sampling Australian bees this month after they were released in the Central Valley.

Daily Inter Lake
9-7-07
EXHIBIT 3
DATE 3/19/09
SB 322

The Associated Press

THIS PHOTO provided by the journal Science shows a honeybee carrying a parasitic varroa mite.

New suspect in honeybee deaths

Experts: Surveys of failed colonies show traces of same paralysis virus

WASHINGTON (AP) — Scientists have a new suspect for a mysterious affliction that has killed off honeybees by the billions: a virus previously unknown in the U.S.

The scientists report using a novel genetic technique and old-fashioned statistics to identify Israeli acute paralysis virus as a potential culprit in the deaths of worker bees, a phenomenon known as colony collapse disorder.

Next up are attempts to infect the bees with the virus to see whether it is a killer.

"At least we have a lead now we can begin to follow. We can use it as a marker and we can use it to investigate whether it does in fact cause disease," said Dr. W. Ian Lipkin, a Columbia University epidemiologist and co-author of the study. Details appear this week in Science Express, the online edition of the journal Science.

Experts said mites, pesticides and poor nutrition remain suspects, as does the stress of travel. Beekeepers shuffle bees across the nation so the bees can pollinate crops as they come into bloom, contributing about $15 billion a year to agriculture.

The newfound virus may prove to have added nothing more than insult to the injuries bees suffer, several experts said.

"This may be a piece or a couple of pieces of the puzzle, but I certainly don't think it is the whole thing," said Jerry Hayes, chief of the apiary section of Florida's Agriculture Department.

STILL, SURVEYS of honeybees from decimated colonies turned up traces of the virus almost every time. Bees untouched by the phenomenon were virtually free of it.

"The authors themselves recognize it's not a slam dunk, it's correlative. But it's certainly more than a smoking gun — more like a smoking arsenal. It's very compelling," said May Berenbaum, a University of Illinois at Urbana-Champaign entomologist who led a study of the decline in honeybee populations.

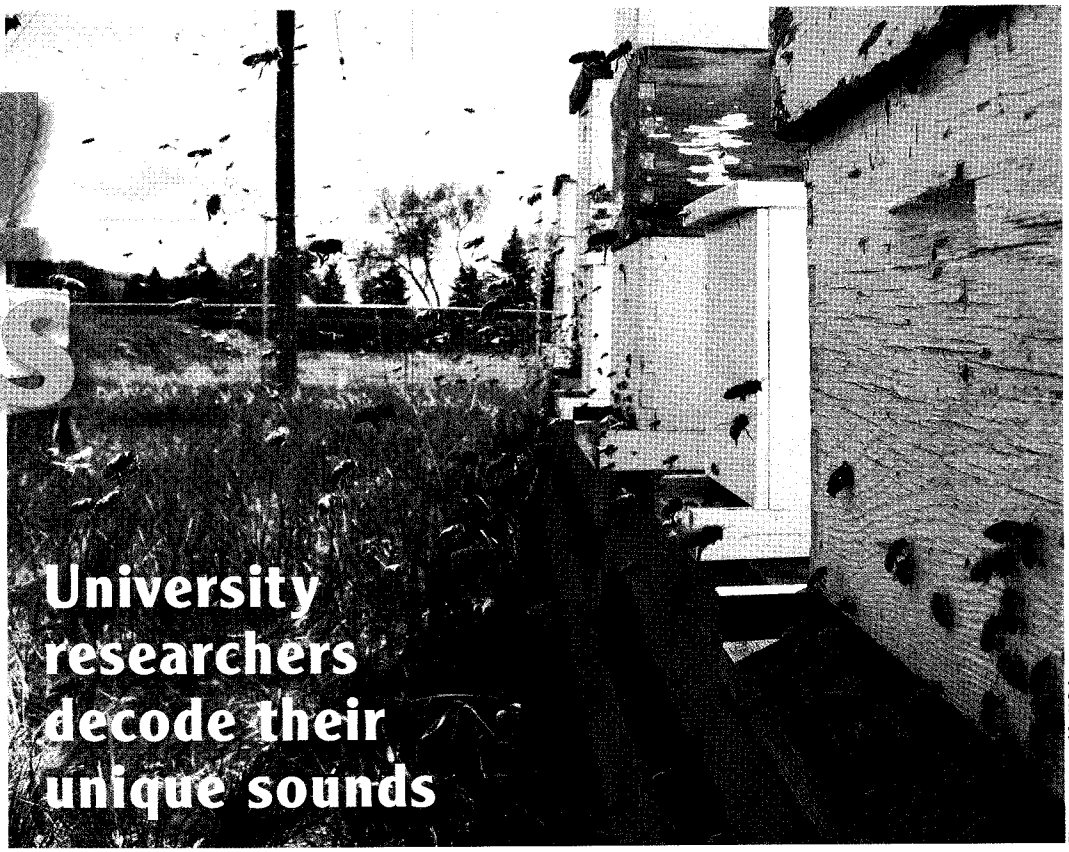
For Berenbaum and others, colony collapse disorder is only the latest devastating problem to beset bees.

"Even if we were to solve this CCD thing tomorrow ... we would still be in a crisis situation because we have these other problems," said Nicholas Calderone, an entomologist at Cornell University.

RESEARCH VIEW
www.umt.edu/urelations/rview
Vol. 9 No. 1 | Innovation & Scholarship at The University of Montana | SPRING 2007

EXHIBIT 3
DATE 3/19/09
SB 322

The BUZZ on BEES



University researchers decode their unique sounds

Photos courtesy of Scott Debnam

Everyone has heard of the canary in the coal mine, which sways or drops dead in the presence of poisonous gas, alerting miners to get out.

Now a University of Montana research team has learned to understand the collective buzzing of bees in their hives, which can provide a similar biological alert system.

But bees evidently provide a lot more information than canaries. The researchers, who work for a UM spin-off technology company called Bee Alert Technology Inc., have found that the insects buzz differently when exposed to various poisonous chemicals.

"We found bees respond within 30 seconds or less to the presence of a toxic chemical," says Research Professor Jerry Bromenshenk. "The military is interested in that for countering terrorism. But the real surprise was that the sounds bees produce can actually tell what chemical is hitting them."

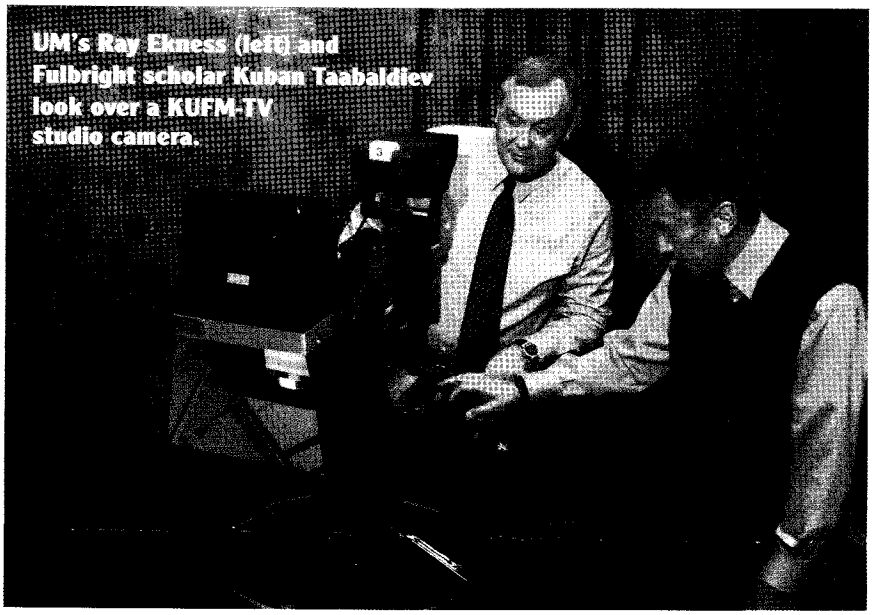
The insects also make different sounds when attacked by honeybee maladies such as varroa mites or foul brood. This may lead to applications that help beekeepers maintain healthy hives.

"We can tell not only whether the colony has mites or not," Bromenshenk says, "but also the level of infestation they have. The sounds they make change with every stressor in characteristic ways."

Scott Debnam, a Bee Alert field technician and self-described "bee whisperer," says people have known for centuries that hives make a different sound when the queen is removed. Now modern listening equipment and computer software have revealed a secret bee vocabulary much more intricate than previously thought.

Bees lack sound-making organs, but they buzz by vibrating their wings and bodies and pushing air through spiracles – **Bee buzzes** – *continued back page*

Left: Larry Tarver, a UM software engineer who designed a program to analyze bee buzzes (far right), holds up honeybees for his partners to examine in a Virginia bee yard.
Top: UM research hives at Fort Missoula



UM's Ray Ekness (left) and Fulbright scholar Kuban Taabaldiev look over a KUFM-TV studio camera.

Exploring Montana Media

Kyrgyz scholar hopes to take home UM-style journalism

It wasn't that Ray Ekness didn't know where Kyrgyzstan was when he agreed to help bring Fulbright scholar Kuban Taabaldiev to UM. He just didn't know where it was *exactly*.

"I think I've learned a lot more about Central Asia than I would have otherwise," says Ekness, a UM associate professor of radio-TV, laughing.

Taabaldiev, a career journalist who has worked for a news service in his native Kyrgyzstan, the BBC in London and the United States Information Agency, arrived at UM in November to study rural media.

Montana was one of the four states Taabaldiev had listed as preferences when he applied for the Fulbright grant, along with Colorado, Utah and Missouri. He says he was looking for a landscape and population distribution similar to that in his home country.

Kyrgyzstan is a mostly mountainous nation in Central Asia, bordered to the north by Kazakhstan, the south and east by China and the west by Uzbekistan and Tajikistan.

But unlike most of its neighbors, Taabaldiev says, Kyrgyzstan has a relatively free press. What they lack are the finances and know-how to become truly effective.

"There is media in the big cities," says Taabaldiev, who lives and teaches in the nation's capital, Bishkek. "But in the larger regions of Kyrgyzstan, people cannot find proper media, especially electronic media, and there is less print media available.

"Some newspapers in some communities can't even find a simple computer to type, lay out or print from," he says.

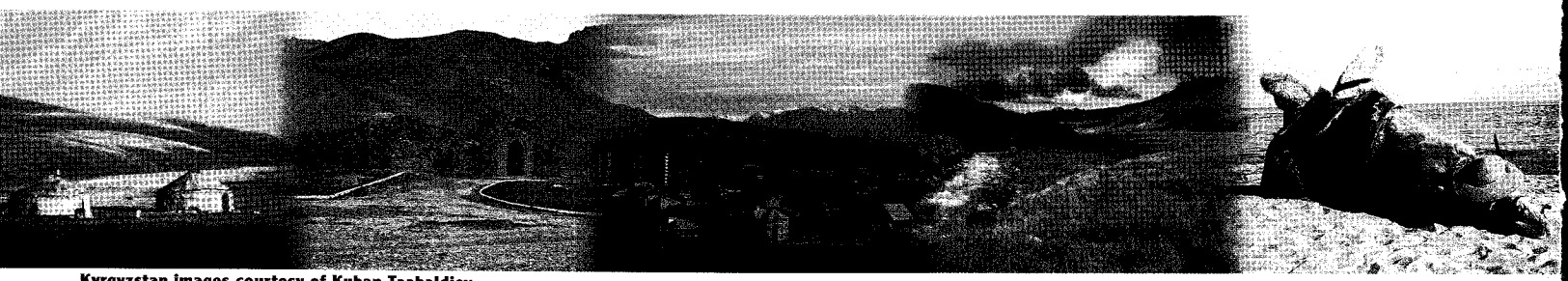
The media, especially in print form, has an uphill battle in rural Kyrgyzstan. They lack money, and there is a vicious cycle that makes it almost impossible to obtain money by traditional means.

"They (newspapers) can't issue enough papers because there aren't enough local people who can buy them, so no companies are willing to advertise," Taabaldiev says.

Getting Here

Taabaldiev was directing Kyrgyzstan's national news agency in March 2006 when word came down from a new press secretary that all heads of national news agencies were to be replaced by fresh appointees.

Though surprised, Taabaldiev says he had "no objections" to the decision, hoping it would bring in fresh people with fresh



Kyrgyzstan images courtesy of Kuban Taabaldiev

perspectives to move the agency forward.

When none of the alternate positions he was offered looked appealing, Taabaldiev, who also teaches college journalism classes, decided to apply for a Fulbright grant.

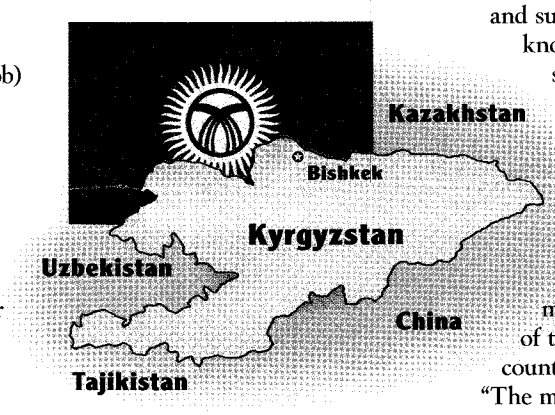
The Fulbright Program, which operates in more than 150 countries worldwide, is sponsored by the U.S. Department of State and administered by the Council for International Exchange of Scholars. Recipients of Fulbright awards are selected on the basis of academic or professional achievement, as well as demonstrated leadership potential in their fields.

In Kyrgyzstan, Taabaldiev grew weary of the bureaucratic delays with the Fulbright Program and applied to a media consulting firm – a position he was offered.

"Immediately after I was offered (the job) I got contacted by the embassy," he says.

Taabaldiev knew right away that he would turn down the consulting job to come to the United States to conduct research and continue to observe the international media.

"I will keep my position at the university because they need a professor with international experience," he says. It's a qualification his time here will further bolster.



Rural Media in Montana

"As soon as I knew he was coming I started making a list," Ekness says. Local TV stations, independent and chain-owned newspapers, radio stations and Web-specific publications all made the cut.

Ekness figured the best thing he could do to help the visiting professional was to put him in contact with as many people as possible.

Taabaldiev says his work and research with television outlets here has been particularly rewarding in part because of his lack of experience in that medium, but also because TV is such a powerful and effective way to reach people.

"If I can explain the style and methods of how TV journalism works in the U.S., it will be more useful than other media," he says. "In Kyrgyzstan the most influential media is TV."

Ekness says that public broadcasting systems were of particular interest to Taabaldiev. So it was important for Taabaldiev to discover that KUFM, one of Montana's PBS stations, is headquartered just out the back door of his office.

But for all the geographic and population distribution similarities between Montana and Kyrgyzstan, there are still plenty of differences that make Montana a slightly imperfect laboratory for Taabaldiev's study.

"What is interesting here is that the mountains are heavily populated and not the plains," Taabaldiev says. "It is vice versa in Kyrgyzstan."

He also noted there are no great economic disparities between states or regions in the United States. People in Idaho live in much the same fashion as those in Montana. Taabaldiev says in Kyrgyzstan, which is smaller than Montana, there is a sharp contrast between the northern and southern regions of the country.

"The south side level of life is lower than the north side," he says. "In the U.S. you cannot feel it – all people are in the relatively same condition."

Small-Town Kyrgyzstan

For Taabaldiev, coming to UM has worked out better than expected. He knew he would be in a familiar landscape and surrounded by capable faculty, but he did not know UM boasted one of the finest journalism schools in the United States.

"I did not expect that UM was one of the top 10 schools of journalism in the country," he says. "I did not expect it in this kind of state, which is not thought of as a leading state."

Beyond the caliber of the faculty themselves, Taabaldiev has made note of the methods of teaching here as a model for some of the journalism courses he teaches in his home country.

"The media in Kyrgyzstan is in transition because many teachers and mentors were trained in the Soviet style," he says.

Taabaldiev has tried to get international journalists to come in and teach to supplement his own international experience, so that the new crop of young journalists can one day mentor and teach a more independent, Western style of media.

Ekness says the challenges Taabaldiev faces in the education and practice of journalism are not that different from the challenges he will see here in America.

"It's the same story as we have here," Ekness says. "How do we get from large media markets to small-town Montana?"

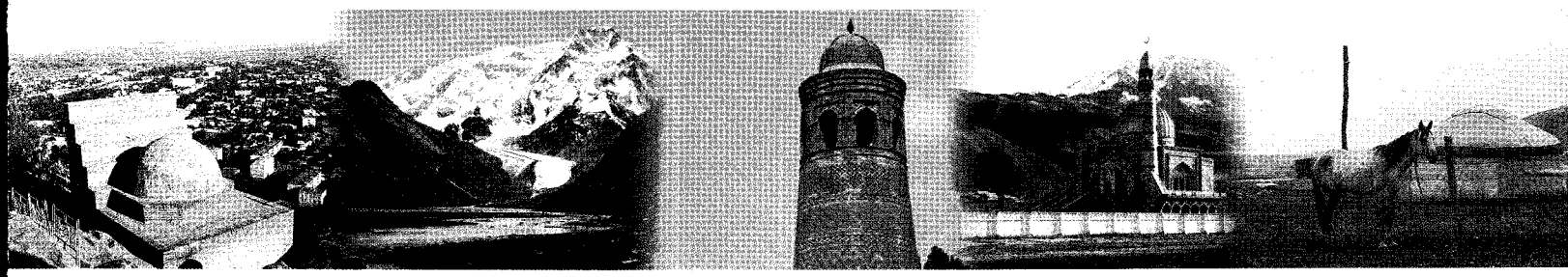
What's more, Ekness says, the demise of the traditional newspaper, burgeoning Web-based media and changing demographics are reshaping the industry at such a fast pace that even long-established Western media has a hard time figuring out how to cope.

"Local is what makes you unique," Ekness advises, regardless of the tools. "If you concentrate on that you'll be successful."

And as Taabaldiev continues to observe the similarities between his country and Montana and to decide what will or won't work, Ekness is keeping his eyes peeled for any insight it could give about ways journalism could be better here.

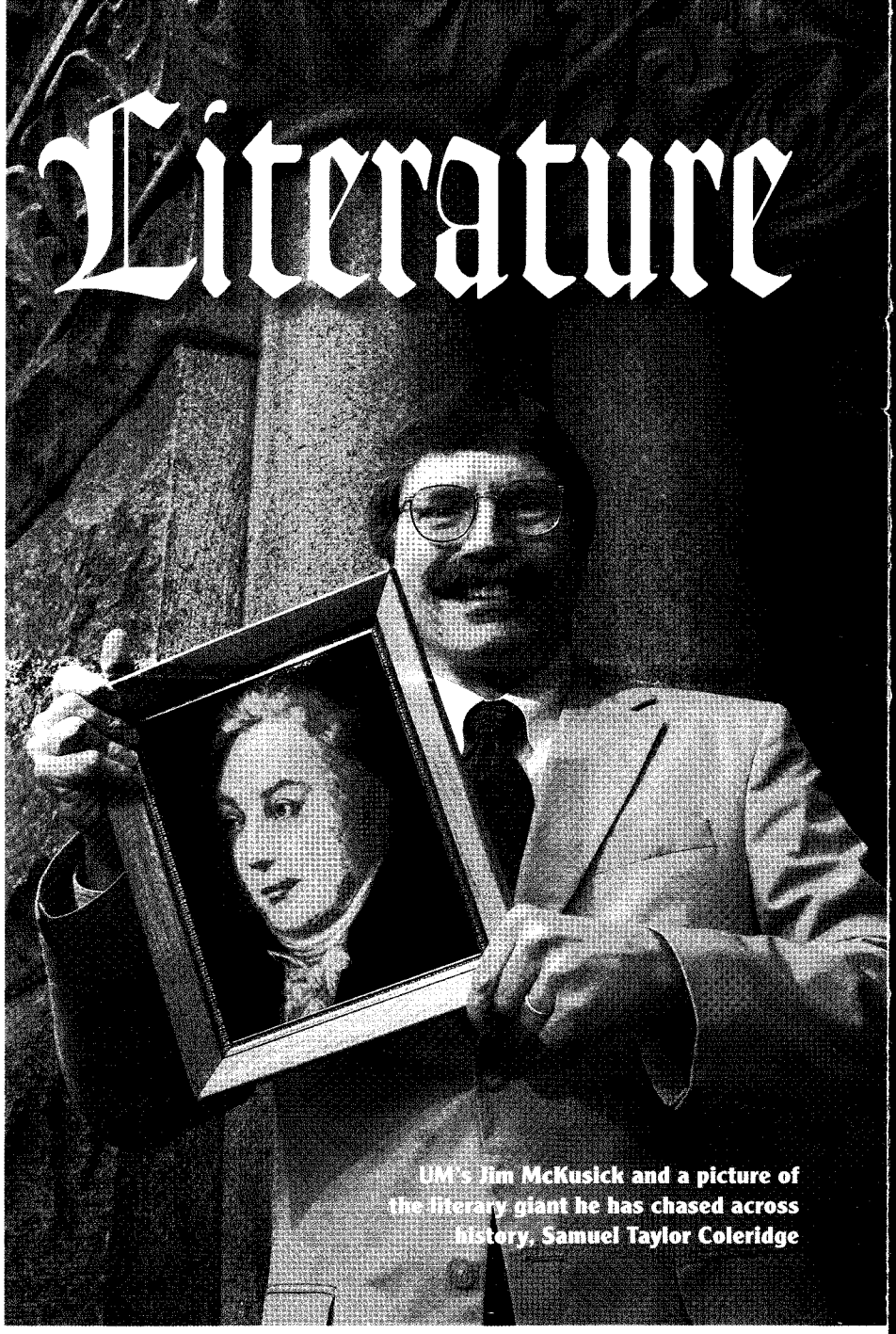
"I'll be interested to see what he comes up with at the end," he says.

– By Alex Strickland



Lost Literature

UM scholar helps unveil great poet's secret work



UM's Jim McKusick and a picture of the literary giant he has chased across history, Samuel Taylor Coleridge

Samuel Taylor Coleridge was one of the greatest poets, critics and philosophers of the 1800s. Best known for "The Rime of the Ancient Mariner," he was a prolific author who helped found England's Romantic Movement.

Perhaps he was more prolific than anyone knew. UM administrator Jim McKusick and his research partners believe they have uncovered a previously unknown Coleridge work – an 1821 English translation of "Faust," the classic German tale about a man selling his soul to the devil, which previously had been attributed to "Anonymous."

"It was hidden in plain sight," McKusick says. "Who knew that Coleridge had published a translation of the greatest dramatic work of the age? It changes our whole understanding of this towering literary figure."

McKusick, dean of UM's Davidson Honors College and an English professor, is a self-described "Coleridgean" who has read everything the Englishman ever wrote – enough to fill 50 volumes. To someone like him, the "Faust" translation shouts Coleridge on every line.

"But believing that and proving that are two different things," he says.

Researchers started building the case that Coleridge actually wrote the translation a quarter century ago. It all started when McKusick's mentor, Paul Zall, a Pulitzer Prize-winning scholar of English Romanticism and American literature, started work on a bibliography of all Coleridge works at California's Huntington Library. Huntington is one of the major scholarly libraries in North America, with especially strong holdings in British literature and history.

Zall knew Coleridge had contracted with London publisher John Murray to do a "Faust" translation in 1814. The poet even was given an advance of 100 pounds, but he never produced the project for Murray – though scholars suspect he started work on the translation. (McKusick said Coleridge was a well-known procrastinator who also was plagued by opium addiction.) Murray was friends with Coleridge and likely wrote off the advance as a bad debt.

Then in 1820 a collection of engravings to illustrate "Faust" came to England from Germany. Another English publisher, Thomas Boosey, a rival of Murray's, wanted text to illustrate the engravings. A letter shows Boosey knew Coleridge had worked on a translation and contacted the poet.

"We don't have Coleridge's direct response," McKusick says, "but I speculate it went something like this: Coleridge said, 'Yes, if you pay me, I can produce a verse translation quickly – because it's almost done – but you must swear never to reveal my name as the translator. It must go to the grave. Otherwise, Murray will come after me for his 100 pounds, plus interest, plus breach of contract.'"

McKusick also believes Coleridge may not have wanted his name associated with "Faust" because of its controversial, devilish themes. Written by Johann Wolfgang von Goethe, "Faust" is considered by some to be the single greatest work of German literature. It's a story of the archetypal conflict of good versus evil, and what Goethe brings to the table is a deep metaphysical concern about the origin of evil and human nature. It asks, what is it about our nature that tempts us to evil deeds and thoughts?

At any rate, Boosey produced a beautiful coffee-table book with wonderful verse by "Anonymous" in 1821. It was popular enough to receive a second printing in 1824.

When Zall came across the well-crafted verse in the Boosey translation in 1971, he was convinced there was only one person in England at that time capable of writing so well – Coleridge. He found many echoes of Coleridge's style in the work, and for the next 20 years he made his case that the literary great was the author. But in the end, most scholars told Zall it was a fine theory, but you can't really prove it.

That's where McKusick comes in. In 1989 he was working at the Huntington Library, and Zall came to his desk and whacked down a foot-high stack of manuscript. "Jim," he said, "I give you this as my legacy. This is Coleridge's translation of 'Faust.' Good luck and Godspeed."

McKusick said reading that manuscript was a "Eureka!" moment for him. He, too, thought only Coleridge could have written it. But there is some evidence against the theory.

For one thing, according to the poet's nephew, Coleridge said, "I never set pen to paper as translator of 'Faust.'" ("He lied," McKusick contends. "He was covering his own tail.") Also, some unknown librarian from the late 1800s catalogued the translation under George Soane, a translator of the Coleridge period, "on the basis of no evidence we are aware of," McKusick says. "I think it was just a hunch, but it has colored the conversation to this day."

The "Faust" manuscript gathered dust until 2003, when McKusick got a call from his good friend Fred Burwick, an English professor at the University of California, Los Angeles. Investigating Coleridge's activities as a translator, Burwick recalled Zall's claims in 1971 and looked again at the "Anonymous" translation. Convinced that Zall had been right, he asked McKusick for the collection of Zall's notes. After McKusick sent him a copy of the 12-inch stack, Burwick said "Jim, this is certainly by Coleridge, and I think we can prove it."

During thousands of hours over the next few years, McKusick ventured into the world of mathematics to make his case. He used statistics to compare the "Anonymous" translation to Coleridge works, as well as writings of other leading contenders from that era, such as Soane.

McKusick used "stylometrics" software to compare the various writings. Stylometrics is an area of study that suggests every writer uses a characteristic vocabulary – a "literary fingerprint," so to speak. The features of this vocabulary tend to recur with a consistent relative frequency.

He says the software he used for the study, "Signature Stylometric System," is free and downloadable by everyone courtesy of the University of Leeds.

"One way to do stylometric analysis is to just crunch every word in the text and find their distribution by word length," McKusick says. "It generates a bell-shaped curve to compare authors. This is generally not considered vastly reliable, but it's fun to do."

When he used this method to compare the "Faust" translation to an 1813 Coleridge play called "Remorse," it matched up almost perfectly. "Again, that wasn't proof," McKusick says, "but it's suggestive. I ran that test and said, 'Boy, I like to see that.'"

The next approach, which is considered much more reliable, is to use stylometrics to analyze the texts' functional keywords – words authors tend to use with reliable frequency. They don't have to be large, distinctive words. In fact, the words he found Coleridge used with the same relative frequency from his early to his late plays were: he, in, now, of, shall, then, this, to, which and your.

McKusick studied the chi-square value of the different texts,

Then to the sheltering cave thou leadest me,
And there layest bare the deep and secret places
Of my own heart. There I may gaze upon
The still moon wandering through the pathless heaven;
While on the rocky ramparts, from the damp
Moist bushes, rise the forms of ages past
In silvery majesty, and moderate
The too wild luxury of silent thought.

– From the 1821 "Faust" translation now attributed to Coleridge

which is a standard test of statistical significance. It shows a pattern of resemblance or difference between the two scientific samples.

"To have a good chi-square analysis you need a good sample size," he says, "which is why you don't pick out the fancy 10-syllable words. There aren't enough of them in the text, so you would never get a significant sample. But with short keywords, you get what you need."

In the end, the computer analysis of the keywords between the "Faust" translation and Coleridge's play "Remorse," showed a nearly exact match. Results from the other contending authors weren't even close.

"This showed the author of the 1821 'Faust' is the same as the author of 'Remorse,' whom we know to be Coleridge," McKusick says, "and now we had found objective evidence for this claim."

McKusick says Dave Patterson, chair of the UM mathematics department, has been a valuable consultant, helping fix some initial errors in the mathematical argument and reviewing his subsequent work on the topic.

He says this same stylometric method was used in the 1960s to prove the authorship of the Federalist Papers – essays written by Alexander Hamilton and James Madison to defend the Constitution. Madison, it turns out, wrote the pieces where an author wasn't specified.

McKusick says other lines of evidence came from his partner, Burwick, who has near-native fluency in German. He went to the original sources of "Faust" and found some "smoking guns," including a letter by "Faust" author Goethe himself that says, "Coleridge is translating 'Faust.'"

All this was enough proof for Oxford University Press to green-light a book titled "Faustus: From the German of Goethe, Translated by Samuel Taylor Coleridge." Edited by Burwick and McKusick, the book is slated for a September release.

"We are so excited because there is a remarkable beauty in this verse," McKusick says. "This is some of the best writing Coleridge ever did, and we are talking about a major poet here."

McKusick says their results remain controversial. At the international Coleridge Conference last summer in England, many attendees found their argument compelling, while others basically said, "This could not possibly be by Coleridge, because if he had written such a text, we would surely know about it."

"My colleague, Fred Burwick, had a wonderful comeback," McKusick says. "It's from the German composer Carl Orff: 'Where no one has sought, until now, no one has found anything.'"

– By Cary Shimek

A collapsing structure at Coloma ghost town

Hunting History

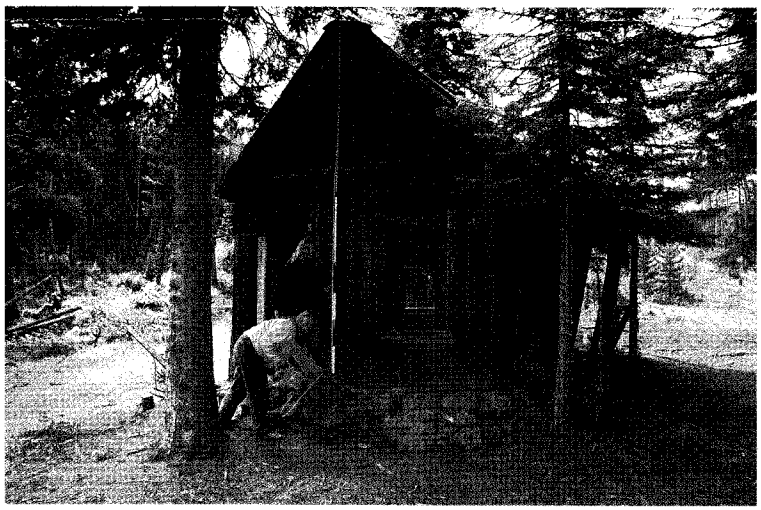
UM archaeologists explore two intriguing sites

Deep in Western Montana's mountains, UM researchers are uncovering secrets that history books rarely hint at.

Outside the town of Plains in a steep canyon are Asian-style terraces, where Chinese immigrants are believed to have grown fresh produce to sell in 1800s mining camps. In another Western Montana mountain range sit remnants of a mining community that belie the Wild West image of such a place.

"When we do archeology, we're often criticized for it being an expensive way to conduct history," says Kelly Dixon, an assistant professor of anthropology at UM. "But a lot of people are marginalized in history books, and archaeology is the solution to addressing those people."

Dixon is internationally known for her ongoing work at the famed Donner Party campsite in California, where she co-leads a team of experts who are trying to reconstruct four months during the winter of 1846-47, when half the party lost their lives – and the remainder may have resorted to cannibalism to survive.



Graduate students Molly Swords and Shannon Vihlene record the front elevations of a Coloma cabin.

But she is also excited about two projects closer to home, both because she finds them fascinating and because of the heavy involvement of UM students.

At the Montana ghost town of Coloma, doctoral student Mark Timmons is sewing together field research, oral histories and old photos to reconstruct the history of a mining town where libraries were almost as prevalent as saloons, and children, not prostitutes, were the most common sight on the streets.

Outside Plains another Ph.D. student, Christopher Merritt, seeks to uncover the mystery of expertly constructed dry-laid stone terraces on a mountainside in the Lolo National Forest.

At both sites, summer field schools will involve many more students from the University, which has partnered with the U.S. Forest Service and Bureau of Land Management to conduct the research.

"What we're doing now is creating a series of research projects the students can take on as their own to learn how a large research team operates," Dixon says. "Yes, we're doing research and filling in gaps in Western history, but the research is being done by students who are very skilled. Ideally, they will publish papers, learn field work and take ownership of research on two projects that are significant to this region's cultural history."

Hundreds of thousands of Chinese people came to the American West during the Gold Rush era, many to seek their fortunes, some to escape China's poverty. That many of them met with bigotry, violence and death is known. That thousands of them helped build America's railroad system also is known.

But what happened in the Plains area? Local lore has it that as the railroad blasted its way through the mountains there, hundreds of Chinese workers were killed. Did that send the Chinese survivors into the forest, looking to escape the alleged bloodshed and searching for new ways to survive in a strange and sometimes harsh land?

"The general consensus is the terraces must be Chinese," Dixon says. "They were known for terraced agriculture in China's mountain environments and likely migrated similar techniques to the West."

But there is no documentation to be found of either deliberate violence or accidental death among Chinese railroad workers in the Plains area – just a mention in a 1924 Plainsman newspaper article that 6,000 Chinese immigrants were used on railroad construction.

"Without further documentary evidence, we're stuck with the local lore that the Chinese built the terraces to escape harsh treatment," Dixon says. "This is a wonderful opportunity to work on a potential Chinese site in a rural area, as opposed to Chinatowns."

The terraces are "exquisite," Dixon says, so much so that some have called them "the Machu Picchu of Western Montana," referring to the well-preserved pre-Columbian Inca ruin, circa 1440, located nearly 8,000 feet above sea level on a mountainside in Peru.

Merritt will help oversee excavation at the site this summer in what could be the first of several seasons of work. They will find what they find, of course, but many things could turn up to indicate Chinese people did indeed build the terraces.

"There are a lot of products that came in Chinese-made containers, such as soy sauce or bean paste," Dixon says. "You may find evidence of Chinese utilitarian brownware, which held such products, which is quite distinct from European- and American-made wares."

Pieces of Chinese-style rice bowls or a meat cleaver with Chinese symbols also are among the types of artifacts used to identify Chinese sites and that could help Merritt confirm the local belief that the Chinese built the terraces. From soil samples taken last year, when Merritt and company mapped the area, corn pollen was found, indicating one of the crops grown there.

Early excavation provided no artifacts, but UM's researchers expect to uncover some when they work on a cabin site farther down the gulch where Chinese farmers may have lived.

The terraces are the only site of their kind known in Montana. Dixon says Merritt recently submitted a grant proposal to National Geographic for his dissertation work at the terrace site.

Christopher Merritt (standing) and his team excavate near a terrace.

Montana ghost towns, of course, aren't nearly so rare.

But when you consider the stereotype of a frontier-era mining community, the Coloma project takes on a unique edge.

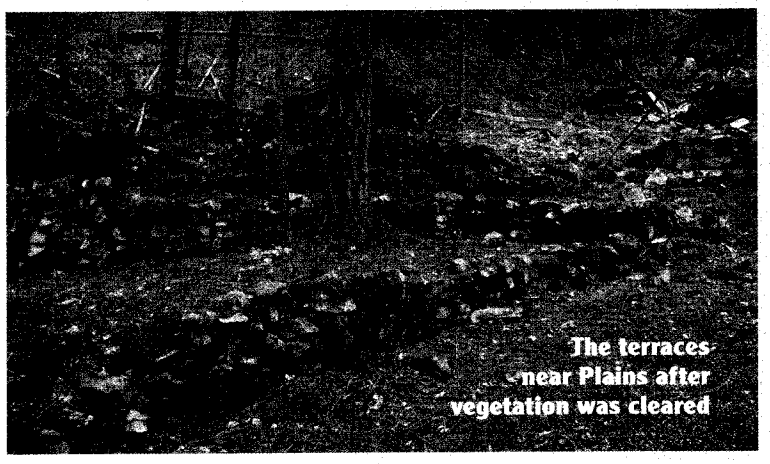
Compare it to the better known – and better preserved – Garnet, Timmons says.

"Garnet had 13 saloons, three brothels full of prostitutes and no library or reading rooms," he says. "Coloma had three bars, three prostitutes, homes with reading rooms and a 400-volume library."

Archaeology largely gets UM's researchers to that point.

"Now, we put on our anthropologist hats," Dixon says, "and Coloma becomes the anti-Wild West town, a place to raise a family." She calls it "the lost city of log cabins."

Along with Jennifer Ogborne, an adjunct UM researcher from the College of William & Mary who is homing in on the food that the miners and their families ate, Timmons has his focus as well.



The terraces near Plains after vegetation was cleared

"Traditionally, mining communities were not multi-gendered," he says. "I'm looking at the effect of gender on community in Victorian society."

Multi-room cabins, as opposed to boarding houses, indicate the presence of families in Coloma, while gender-specific artifacts – teacups, fancy silverware, wallpaper – suggest that "women were (expected) to bring some of the trappings of culture and civility with them when their husbands came West," Timmons says.

Coloma becomes a challenge because the mine there re-opened from the 1930s to the 1950s, and the last occupant didn't leave until 1960. But most of the artifacts Ogborne and Timmons are looking for are buried deeper than the rusty tin cans left from that era.

"The 1890s are not that far away," Timmons says. "We've talked to the granddaughter of one of the founders, and gotten a lot of second- and third-generational stories. We have pictures from the 1960s when a lot of the buildings were still standing. A teacher, Hilma Hansen, left six to eight pages of written notes on the history of the town, and talked about things like a shopkeeper named Wild Bill who played the banjo, and the twice-a-year dances the community held to raise money to pay the school teacher's salary. There's a lot of meat to put on the artifacts we find."

The town site covers 150 acres, which contain 150 archaeological features, from the footprints of cabins and a town dump to a cemetery and mine shafts. Now, to one of the coolest parts of the Coloma project: electronic preservation.

"We're going to create a virtual ghost town that you'll be able to navigate from your computer," Dixon says. "We're going to record every building, record the artifacts we find at each. We'll have architectural renditions of the buildings – 3-D renditions that will allow you to look in the building from different angles. You'll be able to click and see historic photos. It's quite an undertaking."

What's left of the town may all but disappear within the next 10 years. "Sadly, we've gotten heavy snowpack that is starting to collapse what's left even further," Dixon says.

But this summer, 10 to 20 students will join Ogborne and Timmons to continue field work at Coloma. Four to six more will join Merritt at the smaller and more fragile Chinese terrace site. History will not be made. It will be discovered – by UM students who literally will dig into the state's past.

"It's a quintessential historical period of the American West," Dixon says, "and Montana is full of gems. We're so fortunate that the BLM and Forest Service want to partner with us and that we can give our students ownership in these projects."

– By Vince Devlin

Bee buzzes – *continued from front*

tiny airways used for respiration. Debnam says Bee Alert discovered the unique hive sounds two years ago while studying how bees react to a poisoning event. The bees were filmed, recorded and counted, and it soon became apparent that sound was the best medium for determining if something toxic had entered the hive.

"We poisoned them with off-the-shelf stuff like acetone and malathion – the types of poisons they might encounter in an agricultural situation," he says. "They responded within 30 seconds, which is amazing."

Debnam said bees recycle the air in their hives every three minutes and never sleep, so they can provide 24-hour air monitoring, seven days a week.

"With some chemicals you can hear they don't like it," he says. "With the solvent toluene, for example, you hear their buzz go to BZZZZZZZZZZ just like that."

For most chemical agents, however, a more exacting instrument than the human ear is needed. UM electronics technician Dave Plummer designed a listening device that's basically a human hearing aid on a stick. However, if you leave it in a hive for an extended period, all you will hear is "crash, crash" noises as the bees try to pull the foreign object out of the hive or plug the end of the microphone. So Plummer had to create a special screen cage to protect the microphone.

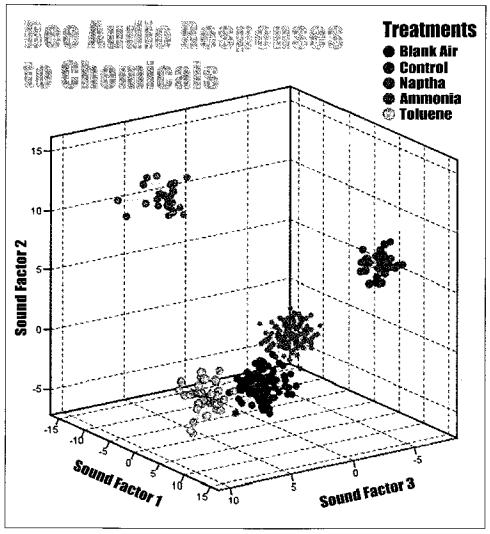
The device records the same type of ".wav" audio files used for digital music. UM software engineer Larry Tarver designed a mathematical algorithm that allows a computer to analyze these files.

"Most of the time for bees their normal sound range is 200 to 400 hertz," Tarver says. "When they get dosed with something, they really go to a high amplitude."

He says his program creates a running average to weed out incidental noises such as doors slamming or horns honking. Bee Alert's Colin Henderson, a faculty member at UM's College of Technology, then examines the audio samples with statistical analysis software. The end result is an electronic signature for each type of chemical or malady affecting the honeybees.

"To be honest, when I was collecting sounds in the field, I thought, 'Oh, this isn't working,'" Debnam says. "But I was wrong. You just can't hear this stuff with the human ear."

Bee Alert uses "smart hives" filled with electronics to monitor bee colonies, and these can be adapted to monitor hive sounds. So if a hive is sprayed with chemicals or invaded by pests or diseases, the sounds can be analyzed and a signal sent immediately via satellite to a beekeeper's computer or cell phone.



This graph shows the consistent audio signatures honeybees produce when exposed to certain chemicals.

The researchers also hope to create a handheld listening device that beekeepers can use on hives to instantly tell whether the bees are healthy.

"What we are trying to do is revolutionize bee technology," says Steve Rice, an electronics engineer and COT instructor. "Patents are pending on a lot of this."

The new audio technology also helps distinguish different bee species. Debnam said there already is a device that can tell the difference between 100 percent European honeybees (the agricultural standard) and 100 percent African bees (also known as killer bees). However, European and African bees interbreed, and the Bee Alert audio technology seems to detect when they have intermingled.

"You don't want Africanized bees," Rice says. "They get angry easily."

There also is some evidence the audio technology can differentiate between the multiple types of beneficial European honeybees used in agriculture. This can be useful to the Montana beekeeper, for example, who needs Russian honeybees instead of the Italian variety that are more susceptible to mites. A simple swipe of a handheld device and the beekeeper knows if the bees she ordered are right.

Besides doing statistical analysis to study bee noises, Bee Alert is using artificial neural networks to examine the buzzes. Information systems manager Robert Seccomb says ANN technology can recognize complex patterns on sonograms and is used a lot in voice-recognition software.

"It's not 100 percent accurate, but it's a lot quicker than statistical analysis," Seccomb says. "Once we build up a sufficiently large library of recordings, I'm pretty sure ANN will give another method of analyzing the sounds."

He said if the statistical analysis method and ANN both agree on the meaning of a buzz, "we'll know pretty much what the answer is. If one says 'yes' and the other says 'no,' then we will say this is a questionable one, and you should check it out anyway."

Honeybees are vitally important to the success of humanity – not because they produce honey but because they pollinate the majority of our crops. Debnam says Albert Einstein once claimed that if all bees disappeared tomorrow, then all people would follow a scant four years later.

"We think this new technology can help bees and revolutionize beekeeping," Debnam says. "If you took a picture of beekeeping from 1947, it would look just like a bee yard today – with the same smoker and other tools. Our audio technology might be one of the bigger things to come along."

– By Cary Shimek

Research View is published twice a year by the offices of the Vice President for Research and Development and University Relations at The University of Montana. Send questions, comments or suggestions to Rita Munzenrider, managing editor, 327 Brantly Hall, Missoula, MT 59812, or call 406-243-4824. Production manager and designer is Cary Shimek. Contributing editors and writers are Brianne Burrowes, Vince Devlin, Patia Stephens, Shimek and Alex Strickland. The photographer is Todd Goodrich. For more information about UM research, call Judy Fredenberg in the Office of the Vice President for Research and Development at 406-243-6670.

The University of Montana